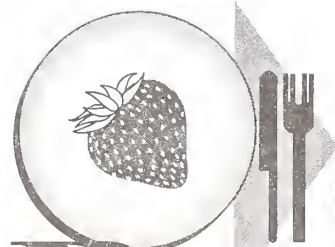


Historic, Archive Document

Do not assume content reflects current scientific knowledge, policies, or practices.



Food & Nutrition Research Briefs

Fat Substitute Boosts Calcium Absorption

A form of inulin, a carbohydrate commonly used as a low-calorie fat substitute in food products, may boost the amount of calcium that teenage girls absorb from their diets. That could lead to stronger bones, say researchers. They tested the calcium-boosting power of a commercially available form of inulin—Raftilose SDP®—supplied by Orafit, the study sponsor.

The study involved 29 girls—ages 11 through 14—who normally consumed a calcium-rich diet. During the first three weeks, the girls drank calcium-fortified orange juice containing either the inulin or a placebo as part of a 1,300-milligram calcium diet. Following a two-week break, the girls repeated the study, with the inulin group now receiving the placebo and vice versa.

While on the placebo, the girls absorbed 416 mg of the calcium in their diet, about what researchers expected. But while taking the supplemental inulin, absorption jumped 18 percent to an average of 494 mg. The difference of nearly 80 mg is about the same amount of calcium that a child would normally absorb from 7 ounces of milk.

Calcium absorption in adolescents normally peaks at dietary levels of 1,300 to 1,500 mg per day, the recommended level for this age group. But even those who meet this recommendation normally only absorb about 30 percent of the calcium available in their diets—or 400 mg a day. The addition of inulin appears to raise the bar for the maximum absorption of calcium.

The researchers believe that inulin could boost the absorption of calcium from diets containing lower amounts of calcium as well. Inulin also acts as dietary fiber, yielding about 1.5 calories per gram, compared to 4 calories per gram for fully digestible carbohydrates like sugar and 9 calories per gram for fat. Natural sources include onions, asparagus, leeks, garlic, artichokes, bananas, wheat, rye, barley, and chicory.

For more information, contact Steven A. Abrams, (713) 798-7000, Children's Nutrition Research Center at Baylor College of Medicine, Houston, TX; sabrams@bcm.tmc.edu

Snacks, Sodas—and Calories—Climbing in Kids

U.S. kids today are eating more food and more calories than kids did 20 years ago, according to the latest U.S. Department of Agriculture data on the food intakes of nearly 10,000 children nationwide. ARS nutritionists combined data from a special 1998 nationwide survey of 5,559 children from birth to 9 years old with those from the 1994-96 national survey (CSFII) of all age groups. The earlier survey included 4,253 children to age 9. Trends gleaned from the combined data generally concur with the 1994-96 findings.

Snacks contributed a significant percent of daily calories—around 20 percent, on average. Among the most frequently reported snacks for the ages 9 and under were milk, fruits, cookies, candies, crackers, popcorn, pretzels and corn chips. Eighty-three percent of kids snacked on the day surveyed—up from 65 percent in the 1977-78 survey.

Over the last two decades, soft drink consumption increased 21 percent among 2- to 5-year-olds and 37 percent among 6- to 9-year-olds. Both age groups also drank more fruit juices and fruit drinks—26 percent and 11 percent more, respectively. Milk consumption, on the other hand, dropped 4 percent among the preschoolers and 10 percent among the older group. Twice as many kids ate crackers, popcorn, pretzels and corn chips in the 90s as did kids in the 70s.

Children's diets provided adequate intakes of most nutrients. However, vitamin E, zinc, calcium, iron and vitamin B₆ intakes were troublesome. Nearly two-thirds of the children failed to get the 1989 Recommended Dietary Allowances (RDA) for vitamin E and zinc. Half did not meet the RDA for

calcium, and close to one-third fell short of the RDA for iron and vitamin B₆.

Summary tables of the combined data are now online at: <http://www.barc.usda.gov/bhnrc/foodsurvey/Whatsnew.html>

For more information, contact Sharon Mickle, (301) 504-0341, Food Surveys Research Group, Beltsville, MD; smickle@rbhnrc.usda.gov

OJ's Anti-Cancer Compound Blocks Enzyme

Flavonoids in orange and other citrus juices not only give the juices their flavors and colors; they are also potent antioxidants. And some are known to kill cancer cells growing in culture. Now ARS scientists believe they know how.

Several citrus flavonoids inhibit certain cytochrome P450 enzymes, the researchers recently reported in *Toxicology*, 2000 (vol. 144, pp. 31-38). That's important because some of these enzymes can turn cigarette smoke, pesticides and other so-called procarcinogens into forms that promote cancer. One P450 enzyme—1B1—is present in high levels in breast and prostate cancer cells but is rarely seen in normal cells.

The tests show that hesperetin—the most abundant flavonoid in orange juice—blocks P450 1B1 from metabolizing procarcinogens, reducing the chances that the body could turn these substances into carcinogens. Hesperetin's effect on this enzyme might lead to the development of alternatives to traditional cancer chemotherapy that affects healthy as well as diseased cells.

For more information, contact Richard Mayer, (561) 462-5897, U.S. Horticultural Research Laboratory, Ft. Pierce, FL; rmayer@ushrl.ars.usda.gov

Not Worth Beans—Think Again

Beans could claim a place among red wine and colorful fruits, berries and vegetables as cancer- and heart disease-fighting foods. An ARS food quality geneticist has found some of the same antioxidants in bean coats that give these other foods their anti-aging properties. The finding is inspiring scientists to find ways to boost the already high nutritional value of beans and could lead to more iron and other vitamins and minerals, as well as more antioxidants.

The researcher found eight flavonoids in the bean coat, six of which are particularly strong antioxidants. Flavonoids are the colored pigments that appear to be the protective factor in red wine and other foods. Bean colors range from the plain-white great Northern

through the cranberry bean's cream with red streaks and flecks to the maroon-red adzuki—and all the way to the totally black bean. Those with brownish and red-brown coats appear to have the most antioxidant potential.

This research also uncovered a link between one of the flavonoids, a color gene, and resistance to bean mosaic disease, which is a major threat to bean farmers. This is the first time such a link has been made. So the ARS scientist and Michigan State University colleagues are searching for more links while trying to identify and learn the function of all the genes for canning quality, disease resistance and nutrition.

For more information, contact George L. Hosfield, (517) 355-0110, ARS Sugarbeet and Bean Research Unit, East Lansing, MI; hosfiel2@pilot.msu.edu

B₁₂ Deficiency May Be More Widespread Than Thought

Nearly two-fifths of the U.S. population may be flirting with marginal vitamin B₁₂ status. A careful look at 3,000 men and women in the ongoing Framingham (Massachusetts) Offspring Study found 39 percent with plasma B₁₂ levels in the "low normal" range—below 258 picomoles per liter. While this is well above the currently accepted deficiency level of 148 pmol/L, some people exhibit neurological symptoms in the higher range, says the lead researcher. More than 16 percent of the subjects fell below 185 pmol/L—a level where many people may be deficient.

One surprise of the study: The youngest group—the 26- to 49-year-olds—had about the same B₁₂ status as the oldest group—65 and up. Most earlier studies had focused on the elderly because they were thought to be at higher risk for deficiency.

B₁₂ deficiency can cause a type of anemia marked by fewer but larger red blood cells. It can also cause walking and balance disturbances, a loss of vibration sensation, confusion, and, in advanced cases, dementia. The body requires B₁₂ to make the protective coating surrounding the nerves, so inadequate B₁₂ can expose nerves to damage.

The good news is that most people can improve their B₁₂ status by eating more fortified cereals and dairy products. These foods were nearly as effective as supplements containing B₁₂ for getting people's blood levels above the danger zone, the researchers reported in the *American Journal of Clinical Nutrition*, 2000 (vol. 71, pp. 514-522). Supplement use dropped the percentage of volunteers in the danger zone—plasma B₁₂ below 185 pmol/L—from 20 percent to 8. Eating fortified cereals five or more times a week or being

among the highest third for dairy intake reduced, by nearly half, the percentage of volunteers in that zone—from 23 and 24 percent, respectively, to 12 and 13 percent.

Oddly, the researchers found no association between plasma B₁₂ levels and meat, poultry and fish intake, even though these foods supply the bulk of B₁₂ in the diet. The study subjects were eating enough of these foods; the vitamin wasn't getting absorbed.

For more information, contact Katherine Tucker, (617) 556-3351, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA; tucker@hnrc.tufts.edu

Cinnamon Extract Spices Up Sugar Metabolism

Cinnamon adds zest to more than just food. The spice contains substances that, in test tube studies at least, wake up body cells to the hormone insulin. Because insulin regulates glucose metabolism and thus controls the level of glucose in the blood, the substances may have the potential to delay or prevent adult-onset, or type 2, diabetes.

ARS has filed a patent application on the active substances. The most active—methylhydroxy chalcone polymer (MHCP)—increased glucose metabolism roughly 20-fold in the test tube assay of fat cells. MHCP and the other active compounds are water soluble and so are not found in the spice oils sold as food additives. Whether they are effective in people remains to be tested.

Nearly 6 percent of the U.S. population—15.7 million people—have diabetes, and one-third of them don't even know it. The large majority of diabetes cases are type 2, the kind that emerges when body cells fail to recognize and respond to insulin as well as they once did.

A search for a natural way to keep blood sugar levels normal began more than a decade ago, when ARS scientists assayed plants and spices used in folk medicine. They found that a few spices, especially cinnamon, made fat cells much more responsive to insulin. With help from other ARS chemists, the researchers identified the compounds in cinnamon responsible for its activity. None of the approximately 50 other plant extracts they evaluated have come close to MHCP's level of activity.

For more information, contact Richard A. Anderson, (301) 504-8091, Nutrient Requirements and Functions Laboratory, Beltsville, MD; anderson@307.bhnrc.usda.gov

Hispanics More Vulnerable to Complications of Diabetes

New findings underscore the need to better educate U.S. Hispanics on how to prevent diabetes or minimize its impact. A study of elderly Hispanics living in Massachusetts shows that those who have diabetes are more likely to lose muscle and the ability to move around with ease or take care of basic needs, such as eating, dressing, bathing and toileting.

These newly recognized disorders—muscle wasting and functional impairment—increase the list of known complications that may result from uncontrolled blood sugar. These include heart disease, blindness, kidney failure and nerve damage in the extremities, according to the researchers.

The researchers studied 556 Hispanic elders, ranging in age from 60 to 92, as well as 158 non-Hispanic white subjects living in the same neighborhoods across Massachusetts for comparison. They reported their findings in the *American Journal of Clinical Nutrition*, 2000 (vol. 72, pp. 89-95).

Diabetes is far more prevalent among U.S. Hispanics than among non-Hispanic whites and African Americans. And it is more severe, judging from the number of Hispanics in the study who use insulin rather than dietary changes or less potent drugs to control their blood sugar.

This group consumed significantly more protein and calories than the non-Hispanic white diabetics, but that did not translate to higher serum albumen levels. Higher albumen levels are recognized as a general indicator of good health and nutrition. So the findings suggest that more advanced diabetes among Hispanics increases their risk of inadequate nutrition.

For more information, contact Carmen Castaneda, (617) 556-3081, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, MA; ccastaneda@hnrc.tufts.edu

Probing Rice Bran's Cancer-Fighting Potential

The health-promoting benefits of rice bran—the nutritious, light-brown layer that covers the familiar white kernel—might be enhanced as a result of a new study being led by ARS scientists. Agency researchers will determine whether certain food-processing techniques can convert key compounds of bran into forms that are easier for the body to absorb and use.

The investigation will look at both soluble and insoluble fiber in rice bran and at antioxidant compounds, such as ferulic acid and its close relatives, already known to prevent formation of harmful

molecules known as free radicals. The work is being conducted under a new cooperative research and development agreement with The Rice Foundation, Houston, Texas. In addition, a researcher at the University of California, Davis, Medical Center in Sacramento will collaborate.

In preliminary experiments with wheat, the ARS and university researchers showed that different techniques for processing wheat bran into cereals made a significant difference in reducing the incidence of a colon cancer indicator in laboratory rats. Their new studies of rice will also track colon cancer incidence in rats. Plans call for using three or four variations in processing the bran with a standard piece of food-processing equipment known as an extruder.

For more information, contact Wallace H. Yokoyama, (510) 559-5695, Western Regional Research Center, Albany, CA; wally@pw.usda.gov

Historical Watercolor Collection of Fruits

A treasure trove of more than 6,000 watercolors of apples, blackberries, cherries, grapes, persimmons and other fruits is safeguarded in the USDA Pomological Watercolor Collection. This array of original prints and related materials is one of the treasures of the National Agricultural Library in Beltsville, Maryland, managed by ARS. Examples of the collection can be viewed on the library's web site at: <http://www.nal.usda.gov/speccoll/collect/water.html>

The collection makes up one of the world's most unique holdings of late 19th- and early 20th-century American botanical illustrations. Many of these beautiful drawings resulted from USDA scientists' need to depict new varieties that they had developed, or had gathered during overseas plant-collecting expeditions. Today, the drawings are a boon to horticulturists, historians, artists and publishers. These specialists—and others—rely on the illustrations as an invaluable source of information about the history of fruit culture in the United States.

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, or marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Ave., SW, Washington, DC 20250-9410 or call 202-720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

For more information, contact Susan H. Fugate, (301) 504-5876, National Agricultural Library, Beltsville, MD; sfugate@nal.usda.gov

Pork Gets a New Image

In a couple of years, consumers won't need to cook pork chops and roasts to the consistency of shoe leather. An innovative program to certify pigs right on the farm as free of trichinosis-causing worms is going through its final shakedown—a 2-year pilot study. The national certification program for *Trichinella*-free pork is a collaborative effort between the meat-packing industry, the National Pork Producers Council (NPPC) and three USDA agencies—ARS, the Animal and Plant Health Inspection Service (APHIS) and the Food Safety and Inspection Service (FSIS).

An ARS parasitologist has played a pivotal role in the program, which is expected to be a model for controlling other foodborne pathogens—including some bacteria—at the source of infection.

He says the number of pigs infected with *Trichinella spiralis* has been on the decline for decades, thanks to changes in the way most pork producers manage their operations. Not a single positive animal turned up out of 220,000 pigs tested during a six-month study of a midwestern packing plant and pork producers in three states. The study was designed to test the feasibility of on-farm certification.

Now, the NPPC is encouraging pork producers to volunteer for certification by having their operations audited by an APHIS-accredited veterinarian. The veterinarians will be looking for practices that would prevent a herd's exposure to infected rodents or wildlife or to raw garbage. Participating packing plants will keep certified pigs separate from non-certified pigs and follow a protocol developed with FSIS. The NPPC expects 90 to 95 percent of pork-producing sites to volunteer for the audit when certification begins in earnest in 2001.

For more information, contact H. Ray Gamble, (301) 504-8300, Parasite Biology and Epidemiology Laboratory, Beltsville, MD; rgamble@lpsi.barc.usda.gov

The *Research Briefs* is published quarterly by ARS Information. For further information or addition to the mailing list, contact Judy McBride, nutrition editor, at (301) 504-1628; or write her at 5601 Sunnyside Ave., Rm. 1-2212-b, Beltsville, MD 20705-5129; jmcbride@ars.usda.gov